AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A method of decoding a multidimensional symbol, the method comprising ~~the steps of~~:

receiving a plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ into a sub-optimal decoder and

generating an estimated transmitted multidimensional symbol $\tilde{\mathbf{S}}$ therefrom;

decoding the estimated transmitted symbol vector $\tilde{\mathbf{S}}$ via hierarchical subset decoding and determining a subset therefrom;

generating a reduced search space *V* associated with the subset; and

decoding the plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ via minimum distance decoding using the reduced search space *V* ~~in order to obtain one of the following: the estimated transmitted multidimensional symbol $\hat{\mathbf{S}}$ in space *V*, soft bit information, hard bit information~~.

2. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ generating a reduced search space *V* comprising generating the reduced search space *V* by minimizing a metric.

3. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ generating a reduced search space *V* associated with the subset comprising generating ~~a~~the reduced search space by minimizing a metric corresponding to the subset prior to generation of the subset.

4. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ receiving ~~the~~a plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ into ~~the~~a sub-optimal decoder and generating an estimated transmitted multidimensional symbol $\tilde{\mathbf{S}}$ therefrom ~~further~~ comprising receiving the plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ into ~~a~~the sub-optimal decoder and generating soft bit information therefrom.

5. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ decoding the received ~~the~~ plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ via minimum distance decoding using the reduced search space *V* ~~and generating a multidimensional symbol $\hat{\mathbf{S}}$ therefrom further~~ comprising decoding the received plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ via minimum distance decoding using the reduced search space *V* and generating a multidimensional symbol $\hat{\mathbf{S}}$ in space *V* therefrom.

6. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ receiving a plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ into a sub-optimal decoder and generating an estimated transmitted multidimensional symbol vector $\tilde{\mathbf{S}}$ therefrom comprising receiving the plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ into an interference cancellation decoder and generating the estimated transmitted symbol vector $\tilde{\mathbf{S}}$ therefrom.

7. (Original) The method according to claim 6, wherein the interference cancellation decoder is selected from the group consisting of a successive interference cancellation decoder, and a parallel interference cancellation decoder.

8. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ receiving a plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ into a suboptimal decoder ~~an ordered or unordered linear decoder~~ and generating an estimated transmitted

multidimensional symbol vector $\tilde{\mathbf{S}}$ therefrom comprising receiving the plurality of signal vectors $\mathbf{y}_{1...}\mathbf{y}_k$ into an ordered or unordered linear decoder~~a suboptimal decoder~~ and generating the estimated transmitted multidimensional symbol vector $\tilde{\mathbf{S}}$ therefrom.

9. (Currently Amended) The method according to claim 8, wherein the linear decoder consists of a decoder selected from the group consisting of a zero forcing decoder, a MMSE decoder, and a matched filter ~~receiver~~decoder.

10. (Original) The method according to claim 1, wherein the multidimensional transmitted symbol $\hat{\mathbf{S}}$ is represented by the relationship $\hat{\mathbf{S}} = \arg\min_{\mathbf{v}\in V} m(\mathbf{y}_1,...,\mathbf{y}_k,\mathbf{v})$, and wherein m is any metric.

11. (Currently Amended) The method according to claim 1, wherein ~~the step of~~ decoding the estimated transmitted symbol vector $\tilde{\mathbf{S}}$ via hierarchical subset decoding and determining a subset therefrom comprises ~~the steps of~~:

defining a hierarchical subset as an ordered set of subsets that cover a multidimensional constellation, wherein the hierarchical subsets are ordered such that if R_k is a subset of the multidimensional signal space that the signal is detected to lie within at some step k, ~~it can be further deived~~said R_k subset is derived into subsets {R_{n,1}, …, R_{n,L}} such that the union of these subsets spans R_k; and

decoding the received symbol vectors over the subset R_k using a desired distance.

12. (Currently Amended) The method according to claim 11, wherein the ~~given~~ multidimensional symbol is detected to lie within R_k at some step k the receiver ~~can~~ further ~~determine~~determines whether the multidimensional

symbol lies in one of the subsets {R_{n[[_]]_1}, …, R_{n,L}} by computing the Euclidean distance between the received symbol vector and the centeriod of each of the subsets.

13. (Cancelled).